

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. 1. *(Currently amended)* Apparatus for the delivery of ions generated at atmospheric pressure to a mass spectrometer having a vacuum system with an entrance opening, the apparatus comprising:
 4. (a) an ion generator that generates an ionization cloud containing ions at atmospheric pressure,
 6. (b) an ion migration drift tube between the ionization generator and the entrance opening, the drift tube receiving the ionization cloud,
 8. (c) a field-generating apparatus that produces a DC potential gradient with curved equipotential surfaces inside the ion migration drift tube that draws ions of the ionization cloud toward the entrance opening, and
 11. (d) a gas port through which a gas may be introduced to the ion migration drift tube in a direction opposite to a direction of ion travel.
1. 2. *(Previously presented)* Apparatus according to Claim 1 wherein the ion generator comprises an electrospray apparatus with a spray capillary that sprays a solution containing analyte molecules.
1. 3. *(Original)* Apparatus according to Claim 2 wherein a pneumatic gas device supports the spraying.
1. 4. *(Previously presented)* Apparatus according to Claim 2 further comprising an arrangement of electrodes and power supplies that produce a strong electric field in front of the spray capillary.
1. 5. *(Previously presented)* Apparatus according to Claim 1 wherein the ion generator comprises a pulse laser that forms an ionization cloud by laser desorption.

- 1 6. (*Previously presented*) Apparatus according to Claim 1 further comprising a
2 ionization gas input path through which gaseous substances may be admixed to
3 the ionization cloud prior to its entry into the drift tube.
- 1 7. (*Previously presented*) Apparatus according to Claim 1 further comprising a
2 needle for producing corona discharge in the vicinity of the ionization cloud.
- 1 8. (*Previously presented*) Apparatus according to Claim 1 further comprising a UV
2 lamp for photoionization in the vicinity of the ionization cloud.
- 1 9. (*Previously presented*) Apparatus according to Claim 1 further comprising an
2 electron source in the vicinity of the ionization cloud.
- 1 10. (*Original*) Apparatus according to Claim 9 wherein the electron source contains a
2 foil emitting beta radiation.
- 1 11. (*Previously presented*) Apparatus according to Claim 1 wherein the gas port
2 introduces gas into the drift tube near the entrance opening of the mass
3 spectrometer.
- 1 12. (*Previously presented*) Apparatus according to Claim 11 the gas introduced
2 through the gas port is heated before introduction into the drift tube.
- 1 13. (*Previously presented*) Apparatus according to Claim 1 wherein the the ion
2 migration drift tube comprises a plurality of electrodes that produce the potential
3 gradient in the drift tube.
- 1 14. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube comprises a resistance material.
- 1 15. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube has a conical or trumpet shape with a wider opening being directed
3 towards the ion generator.

- 1 16. (*Previously presented*) Apparatus according to Claim 1 wherein an opening of
2 the ion migration drift tube facing the ion generator is covered by a grid which
3 bulges outwards.
- 1 17. (*Previously presented*) Apparatus according to Claim 1 wherein the entrance
2 opening is part of a transfer capillary, and wherein an outer shape of a tip of the
3 transfer capillary is convex.
- 1 18. (*Previously presented*) Apparatus according to Claim 1 wherein the entrance
2 opening approximates a funnel shape.
- 1 19. (*Previously presented*) Apparatus according to Claim 1 further comprising a
2 ionization gas input path through which a hot drying gas and charged particles
3 may be admixed to the ionization cloud, the particles having a charge that allows
4 them to neutralize ions in the spray chamber or later in the drift tube.
- 1 20. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube has a curved shape.
- 1 21. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube is a first drift tube, and wherein the apparatus further comprises
3 additional drift tubes such that the ion migration drift tubes are connected to one
4 another.
- 1 22. (*Canceled*)
- 1 23. (*Previously presented*) Method for feeding ions at atmospheric pressure to a
2 mass spectrometer, the method comprising the following steps:
3 (a) forming an ionization cloud containing charged particles at atmospheric
4 pressure,
5 (b) guiding the charged particles by their ion mobility through an ion migration drift
6 tube ~~with an inner potential gradient to and focusing them into~~ and focusing them into an entrance
7 opening of the mass spectrometer with a DC potential gradient having curved
8 equipotential surfaces, and

- 9 (c) blowing gas into the ion migration drift tube from adjacent the entrance
10 opening.
- 1 24. (*Original*) Method according to Claim 23 wherein the ionization cloud is created
2 by spraying a solution containing dissolved analyte from a spray capillary.
- 1 25. (*Original*) Method according to Claim 24 wherein the spraying is pneumatically
2 supported by a spray gas.
- 1 26. (*Previously presented*) Method according to Claim 24 further comprising drawing
2 charged droplets into the ionization cloud using a strong electric field in front of
3 the spray capillary.
- 1 27. (*Original*) Method according to Claim 23 wherein the ionization cloud is created
2 by bombardment of a sample with light from a pulsed laser.
- 1 28. (*Previously presented*) Method according to Claim 23 further comprising
2 admixing other gaseous substances to the ionization cloud.
- 1 29. (*Previously presented*) Method according to Claim 23 further comprising
2 providing a corona discharge that produces primary ions in the vicinity of the
3 ionization cloud which lead to chemical ionization of the analyte molecules via a
4 chain of ion-molecule reactions.
- 1 30. (*Previously presented*) Method according to Claim 23 further comprising using a
2 UV lamp for ionizing substances in the ionization cloud.
- 1 31. (*Previously presented*) Method according to Claim 23 further comprising using
2 an electron source for ionizing substances in the ionization cloud.
- 1 32. (*Previously presented*) Method according to Claim 31 wherein a foil emitting beta
2 radiation is used as the electron source.

- 1 33. (*Previously presented*) Method according to Claim 23 wherein the gas is
- 2 introduced into the drift tube in a direction opposite the travel direction of the
- 3 charged particles.

- 1 34. (*Previously presented*) Method according to Claim 33 wherein the gas is heated
2 before being introduced into the drift tube.

- 1 35. (*Previously presented*) Method according to Claim 23 further comprising
2 admixing charged particles to the gas, whereby the particles neutralize some of
3 the ions in the drift tube.

- 1 36. (*Previously presented*) Method according to Claim 35 further comprising
2 irradiating an area around the entrance opening with UV radiation to release
3 photoelectrons that neutralize ions.

- 1 37. (*Canceled*).